Nothing Compares
NORTH CAROLINA

Board of Transportation, February 1, 2017

Product Evaluation Program Awareness

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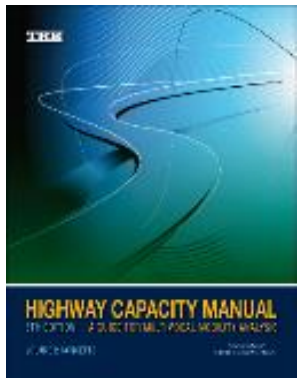
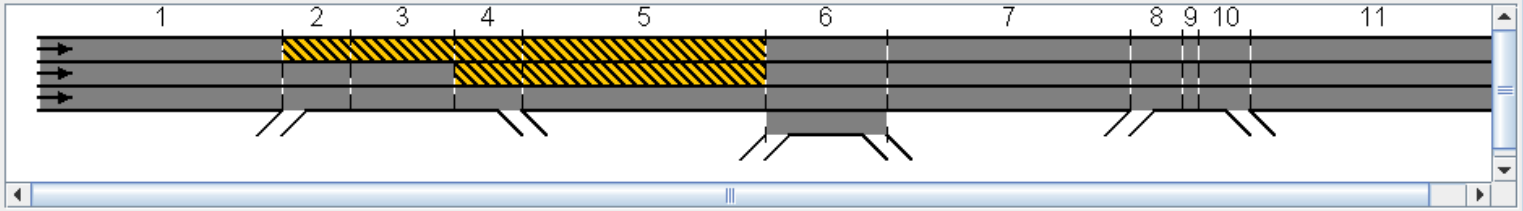
Technology Highlight (Approved)
FREEVAL - WZ

- FREEVAL-WZ is a planning analysis tool used to quantify work zone impacts to freeways.
- Enhanced through NCDOT Research Project 2015-09 to incorporate the Highway Capacity Manual, 6th ed., with Kittelson & Associates and Institute for Transportation Research and Education (ITRE) at NCSU.
- Allows queuing analysis over time (24 hours in 15 minute increments) and space (up to 15 miles).
- FREEVAL-WZ allows our engineers to:
  - Compare Work Zone Scenarios
  - Identify Diversion Targets
  - Optimize Lane Closures - When and How Long
  - Calculate Traffic Volumes, Average Travel Time, and User Costs
  - Analyze Incident Management and Weather Impacts
  - Create Public Outreach Materials



Single Seed/Scenario I/O | **WZ Project** | Compare

Facility Preview



Step 1: Global Inputs | Step 2: AADT Inputs | Step 3: Daily Facility Inputs | Step 4: Advanced Facility Inputs | **Step 5: Work Zone Inputs** | Compare

Work Zones

Add | Remove | WZ Scenario - New Work Zone (10

Time Period

Start Time: 10:00 (1)

End Time: 10:00 (96)

Segments

Start: 2

End: 5

Work Zone Parameters

WZ Type/Severity: 1 Lane Closure

Area Type: Urban

Barrier Type: Plastic Drum

Lateral Distance (ft.): 2

Work Zone Speed Limit: 55

☑ Enable Custom/Advanced Input ☐ Use HCM FFS Prediction Model (Lane Closures Only)

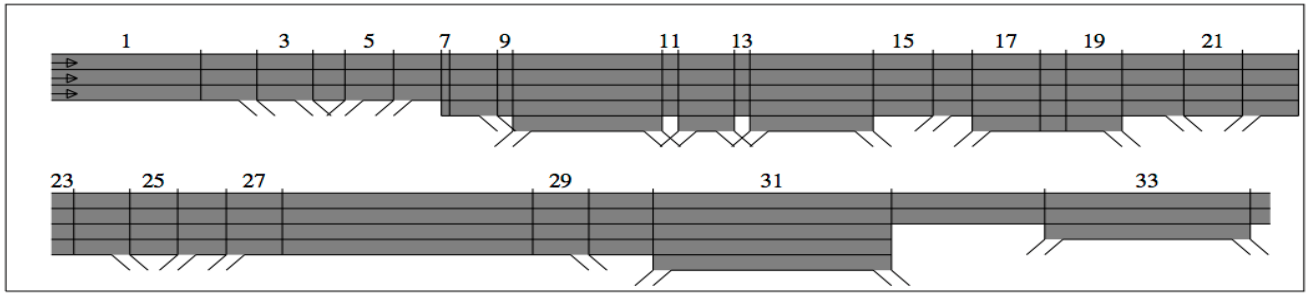
Work Zone Segment Inputs

Work Zone Option	Seg. 1	Seg. 2	Seg. 3	Seg. 4	Seg. 5	Seg. 6	Seg. 7	Seg. 8
Work Zone Active	☐	☑	☑	☑	☑	☐	☐	☐
Lane Closure		☑	☑	☑	☑			
Number of Closed Lanes		1	1	2	2			
Cross Over		☐	☐	☐	☐			
Number of Lanes								
Cross Over Speed Limit								
Shoulder Work		☐	☐	☐	☐			
Use Custom Capacity		☐	☐	☐	☐			
Custom Capacity (veh/ln)								
Crossover CAF		1.0	1.0	1.0	1.0			
Final WZ Capacity (veh/ln)		1937	1937	1565	1565			
Work Zone Speed Limit (mph)		55	55	55	55			
Work Zone FFS (mph)		55	55	55	55			
Override Work Zone FFS		☐	☐	☑	☑			
User Specified WZ FFS (mph)				50	50			

FREEVAL-WZ Report

Summary Output

Project: I-40 Case Study
Facility Length: 12.5 miles (34 segments)
Analyst: ITRE
Analysis Period: 14:00pm - 6:00am (64 time periods)
Scenario: Base Year



Performance Measure	Base Scenario	WZ Scenario 1	WZ Scenario 2	WZ Scenario 3
	I-40 EB	WZ1: 8PM	WZ2: 9PM	WZ3: 10PM
Average Travel Time (min)	26.45	34.93	27.32	26.47
VHT (travel / interval (hrs))	15,205	20,176	15,714	15,213
VHD (delay / interval (hrs))	9,097	14,068	9,606	9,105
Space Mean Speed (mph)	28.2	21.2	27.2	28.1
Reported Density (pc/mi/ln)	20.3	27.1	21.1	20.4
Max D/C	1.21	1.49	1.32	1.21
Max V/C	0.97	0.97	0.97	0.97
User Cost ($)	463,195.50	716,306.88	489,092.81	463,596.81
Max Hourly User Cost ($)	147,699.03	147,699.03	147,699.03	147,699.03
Work Zone Summary				
WZ Name	-	WZ1: 8PM	WZ2: 9PM	WZ3: 10PM
Time Active	-	20:00-0:00	21:00-1:00	22:00-2:00
Segments Active	-	32	32	32
Severity	-	1 lane closure	1 lane closure	1 lane closure
WZ Speed Limit	-	55	55	55
Area Type	-	Urban	Urban	Urban
Barrier Type	-	Soft Barrier	Soft Barrier	Concrete
Lateral Distance	-	2.00 ft	2.00 ft	2.00 ft

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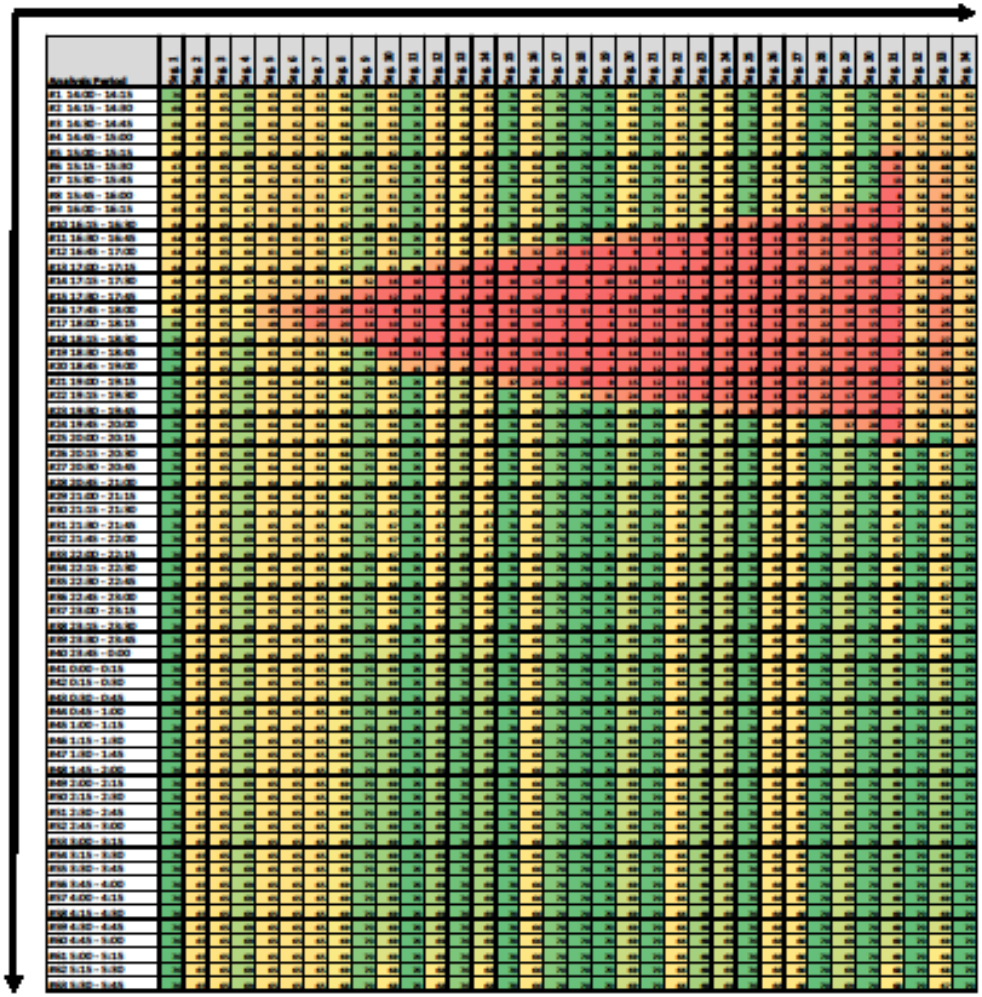
Night-Time Lane Closure Volume Sensitivity

Distance

I-40 East

Time

2 p.m.
to
6 a.m.

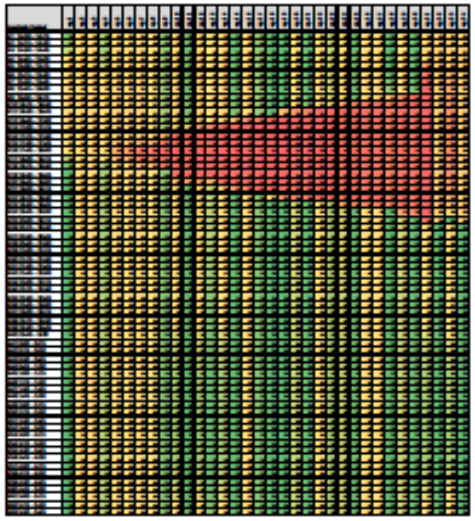


- 70-80 MPH
- 60-70 MPH
- 50-60 MPH
- 40-50 MPH
- 30-40 MPH
- 20-30 MPH
- 10-20 MPH
- 0-10 MPH

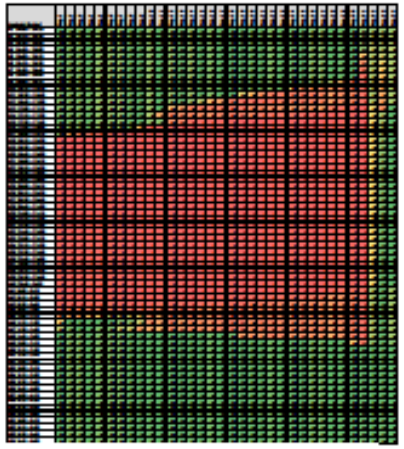
M2-47

ITRE

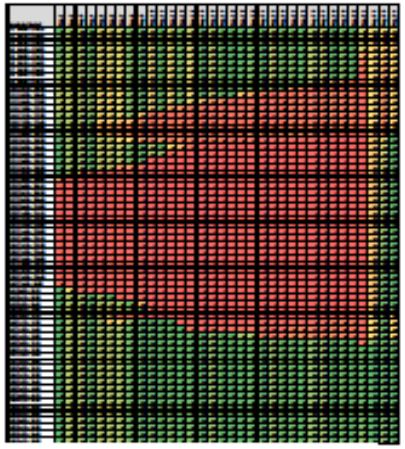
Night-Time Lane Closure Volume Sensitivity



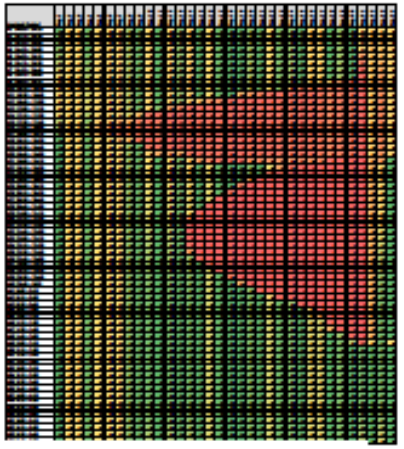
Base Case
– No Work Zone



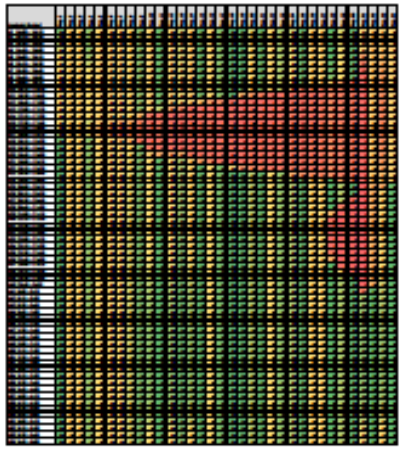
5PM Lane Closure



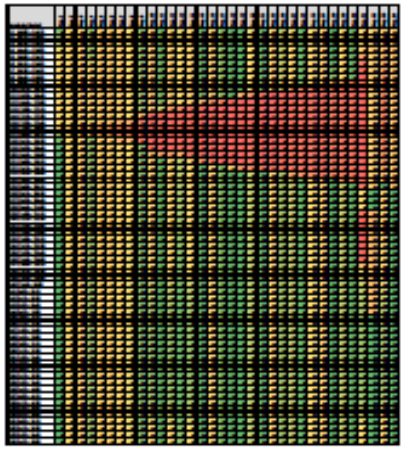
6PM Lane Closure



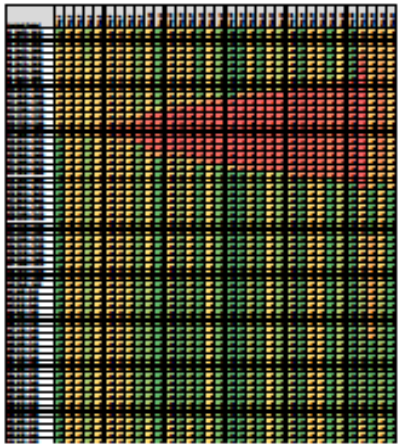
7PM Lane Closure



8PM Lane Closure



9PM Lane Closure

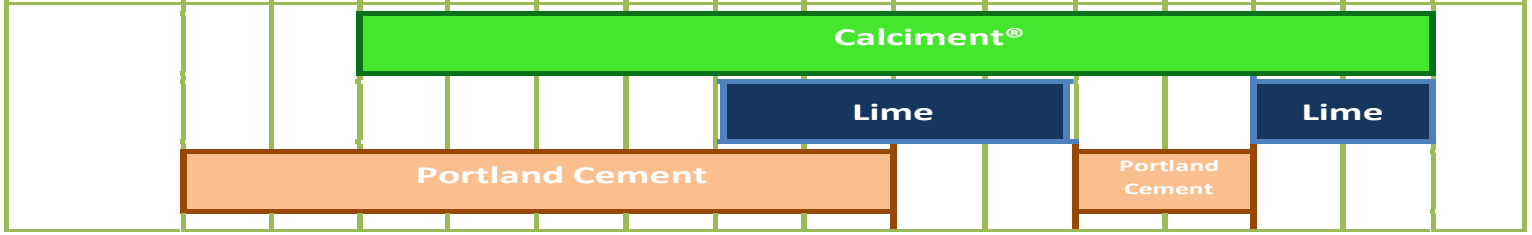


10PM Lane Closure

Product Highlight (Under Evaluation)
Calciment

- Calciment is powder that is a byproduct of lime production that contains both free calcium oxide and pozzolans.
- It is used for subgrade stabilization, full depth reclamation, modifying and drying soils.
- Calciment provides more time for mixing, spreading and compaction than Portland cement, has a lower carbon footprint than lime or cement, contains 100% recycled material, and is more economical than lime or cement.
- LEED certified product and approved in 8 other DOTs and a Turnpike Authority.
- 50% savings vs. Cut and Fill and
  25% savings vs. Lime or Portland Cement.

Unified Group Symbol	GW	GP	GM	GC	SW	SP	SM	SC	ML	CL	OL	MH	CH	OH	PT
AASHTO Group Classification	A-1-a	A-1-a	A-1-b	A-1-b	A-1-b	A-1-b or A-3	A-2-4 Or A-2-5	A-2-6 Or A-2-7	A-4	A-6	A-4	A-5	A-7-6	A-7-5	A-8



Product Highlight (Under Evaluation)
Calciment

1. Calciment is transported to the job site in a pneumatic tanker.

2. Then transferred to a spreader truck.

3. Calciment, water and soil are mixed using a reclaimer.

4. After mixing, a drum roller or sheep foot compacts the pulverized mix.

5. Compacted material is then graded to a final crown, profile and cross slope.

6. Surface is ready for a final smooth roll and seal.

Product Highlight (Under Evaluation)
Calciment

Airports

O-Hare - IL

Piedmont Triad - NC

Richmond Airport - VA

Building Pad Parking Lot

Volvo Plant - SC

Ikea - OH

Amazon Distribution - MD

Wal-Mart - VA

Roads

I-81 -VA

I-79 - PA

Pennsylvania Turnpike

I-90 - OH

I-69 - IN